

ABSTRACT

A method for increasing the etch resistance of positive working chemically amplified photoresist such as 193 nanometer sensitive photoresist, 157 nanometer sensitive photoresist, and deep-UV 248 nanometer sensitive photoresist while improving and maintaining fidelity of lithographic features and critical dimensions. The method involves coating and drying a photosensitive composition onto a substrate. The photosensitive composition comprises a water insoluble, acid decomposable polymer which is substantially transparent to ultraviolet or x-ray radiation and a compound capable of generating an acid upon exposure to sufficient activating ultraviolet, electron beam or x-ray radiation energy. After imagewise exposing and developing, the image areas of the photosensitive composition are irradiated to electron beam radiation to thereby increase the resistance of the photosensitive composition in the image areas to an etchant while simultaneously cooling the photosensitive composition during electron beam radiation to maintain the photosensitive composition at a temperature of less than about 20 °C.